Nigrostriatal Pathway (Dopaminergic)



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Dopamine Pathway
Doberman Pathway
The nigrostriatal pathway is one of the four dopaminergic pathways involved in the release of dopamine.

Location

Substantia Nigra
Substantial Knight
The nigrostriatal pathway begins at the substantia nigra of the midbrain.

Striatum
Striped-ribbon
The nigrostriatal pathway ends at the striatum, specifically involving the putamen and caudate nucleus of the basal ganglia.

Characteristic

Motor Function
Motor
The nigrostriatal pathway is responsible for controlling the motor functioning of the body.

Direct Pathway
Direct-route
The nigrostriatal pathway involves the basal ganglia, which is responsible for both the direct and indirect pathways of movement. The direct (excitatory) pathway begins in the cortex and excites the striatum (D1 receptor). The striatum then inhibits the substantia nigra. Normally, the substantia nigra inhibits excitatory structures. However, if the substantia nigra is inhibited, the thalamus is free to send excitatory input to the motor cortex, which leads to increased movement. Thus, the overall input of the direct pathway is excitatory.

Indirect Pathway
Indirect-route
The nigrostriatal pathway involves the basal ganglia, which is responsible for both the direct and indirect pathways of movement.The first indirect (inhibitory) pathway begins in the cortex and excites the striatum. The striatum then inhibits the subthalamic nucleus, which sends excitatory signals to the substantia nigra. The substantia nigra is then free to inhibit the thalamus, an excitatory structure. With the thalamus inhibited, excitatory signals cannot be sent to the motor cortex, which leads to decreased movement. Thus, the overall input of the indirect pathway is inhibitory.However, the second pathway involves the striatum stimulating the substantia nigra, acting on D2 receptors, which then inhibits the subthalamic nucleus. The inhibition of the subthalamic nucleus then allows excitatory signals from the thalamus to proceed to the motor cortex, resulting in increased movement.

Defect

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Extrapyramidal Symptoms

X-Pyramid

If there is a defect of the nigrostriatal pathway, it leads to the presentation of extrapyramidal symptoms. In the case of inhibition, this can involve a type of pseudoparkinsonism. If instead stimulated, this can involve chorea.

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